

September 2015

# Oswald Research and Creativity Program

UK Office of Undergraduate Research

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# Oswald Research and Creativity Program

Any current UK undergraduate (full- or part-time, enrolled for either semester) who does not already have a four-year degree is eligible for this competition and may submit papers and other projects in the following categories:

1. Biological Sciences
2. Design (architecture, landscape architecture, interior design, etc.)
3. Fine Arts (film, music, painting, sculpture, videotape, etc.)
4. Humanities: Creative
5. Humanities: Critical Research
6. Physical and Engineering Sciences
7. Social Sciences

Entries are judged on originality; clarity of expression; scholarly or artistic contribution; and the validity, scope, and depth of the project or investigation.

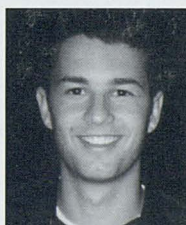
The following are representative winners in the 2004-2005 Oswald Research and Creativity Program:

(Extended versions of some of these entries are available at [www.uky.edu/kaleidoscope/fall2005](http://www.uky.edu/kaleidoscope/fall2005))

## CATEGORY 1: Biological Studies

### 1st Place

**NAME:** Yuriy Bronshteyn  
**TITLE:** Distributed Task  
Related Bold Signal  
During Auditory Sub-  
Second Timing



To read the full article, go to page 45 of this issue of *Kaleidoscope*

### 2nd Place

**NAME:** Salim M. Saiyed  
and Robert A. Yokel  
**TITLE:** Aluminum content of  
commercial foods in the USA, focusing  
on those containing aluminum as  
Food and Drug Administration  
approved food additives

Our primary objective was to determine the aluminum (Al) content of selected food products in the USA that contain Al as an approved food additive. Intake of Al from a recommended serving

of each food product was calculated for comparison to typical human daily dietary Al intake. The samples were acid or base digested and analyzed for Al using electrothermal atomic absorption spectrometry. Quality control (QC) samples, with matrices matching the samples, were generated and used to verify the Al determinations. Food product Al content ranged from  $< 1$  to 27,000 mg kg<sup>-1</sup>. Cheese in a serving of commercial frozen pizzas had up to 14 mg of Al from basic sodium aluminum phosphate; whereas, ready-to-eat restaurant pizza provided 0.03-0.09 mg. Many single serving packets of non-dairy creamer had ~50 to 600 mg Al kg<sup>-1</sup> as sodium silicoaluminate, providing up to 1.5 mg Al per serving. Many single serving packets of salt also had sodium silicoaluminate, although less Al. Acidic sodium aluminum phosphate was in many baking supplies, baked goods, pancakes and waffles. Baking powder, some pancake/waffle mixes and frozen products, and ready-to-eat pancakes provided the most Al of the foods tested — up to 180 mg/serving. Many products provide a significant amount of Al compared to the typical intake of 3-12 mg reported from daily dietary Al studies conducted in many countries.



## CATEGORY 2: Design

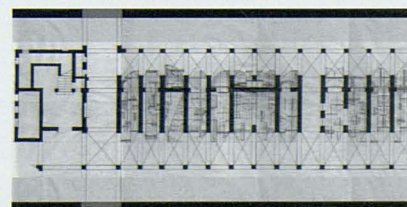
### 1st Place

**NAME:** Catherine Noble  
**TITLE:** ...rediscovering the  
Market's former unity and  
coherence, to be found in its  
parts...



The Rialto Market Conversion was an exploration of the insertion of shop units in the bays of the existing historical arcades of a loggia done by the Italian architect Sansorvino. The Fabriche Vecchie has been stripped of its former glory; the once thriving marketplace is left hollow. Within the bays lies the possibility to rejuvenate the marketplace and return to Venice the Rialto of the past.

I explored the serial nature of the 14 bays in



order to design and build a module to be assembled elsewhere and then inserted



into the bays. I wanted a gentle intervention on Venice to breathe new life into the Fabrice Vecchie.

### the MODULE

The door ... the key to the shop's survival. Once it opens, the space is activated and becomes significant.

The Module is based on the original six panel doors that can still be seen on a few of the bays' entries. The door module becomes the space-making element, source of light, storage, seats, and displays. These "doors" are prefabricated according to the needs of the store and then placed within the bays on five bronze tracks, half a meter apart, which span the entire length of the bay's floor and out a third of the way under the loggia. This Module offers the marketplace a new wealth of freedom in making a new store or café quickly, while at the same time not freezing the bays into a static condition. The owners now have a fully changeable space that can accommodate daily changes such as shopper traffic, or days of stocking, or closing half the store while working on new displays. They act also as physical doors to the bay that will now become the new shop windows containing glass and shelves for the display of products that can be illuminated from behind to create a radiant mosaic that acts as a gentle light for the loggia at night.

Work conducted at: Venice Architecture Studio, Fall 2004, Critic: Pucci D. Ricci

Drawings of the design may be found on the inside front cover before page 1. More images can be viewed at [www.uky.edu/kaleidoscope/fall2005](http://www.uky.edu/kaleidoscope/fall2005).

### CATEGORY 3:

#### Fine Arts

##### 1st Place

NAME: Aleena Slone

TITLE: Daijoubu: Don't Be Discouraged



##### 2nd Place

NAME: Tashenna Slone

TITLE: Enigmatic Dream



### CATEGORY 4:

#### Humanities: Creative

##### 1st Place



NAME: Tasha Pedigo

TITLE: Introduction to Poems: Understanding the Soul in Tieck, Leibniz, Shelley & Kleist

To read the introduction and the poems, go to page 26 of this issue of Kaleidoscope

##### 2nd Place

NAME: Todd Keisling

TITLE: Migration of the Butterfly

To read an excerpt from this novella, go to page 80 of this issue of Kaleidoscope



### CATEGORY 5:

#### Humanities: Critical Research

##### 1st Place

NAME: Andrew Bozio

TITLE: The Pervasiveness of Instability: Mother Courage's (in)Ability to Self-Deconstruct

In recent decades, critical theory has revolutionized the academic task of interpreting literature. At the forefront of this revolution, deconstruction remains an influential and highly provocative tool, as this paper intends to demonstrate. Using deconstruction to investigate a play by Bertolt Brecht, this paper presents a thorough application of Derrida's theory, as well a number of critical insights into *Mother Courage and Her Children*. The purpose is to determine if a text can engage critical theory to deconstruct itself, a valid question because Brecht's style was based on exposing the contradictions in art and society. While these questions are important for interpreting art in contemporary society, they have gained pressing relevance through Derrida's recent death.



##### 2nd Place

NAME: George Younger

TITLE: On the Coexistence of Freedom and Necessity

To read this essay, go to page 55 of this issue of Kaleidoscope



### CATEGORY 6:

#### Physical and Engineering Sciences

##### 1st Place

NAME: Laura A. Buchanan

TITLE: Conformation and Effect of Material Structure on the Bioactivity of Adsorbed Protein Using Fourier Transform Infrared Spectroscopy and Cell Culture Technique

Protein adsorption onto a biomaterial surface is a requirement for cell adhesion on the implant surface. Proper cell adhesion will enhance tissue-implant integration. Previous studies have shown that crystallization of bioactive glass (BG) inhibits protein adsorption, which may contribute to a slow rate of implant integration with bone. In this study, the effect of glass crystallization on the conformation of protein adsorbed on the material surface was analyzed. Furthermore, the protein conformation was correlated to cell





## Oswald Research and Creativity Program (CONT.)

adhesion onto the implant material. Crystallized bioactive glass (CBG) was prepared by heat treatment of 45S5 bioactive glass samples at 700° C for 1 hour. To test protein adsorption, CBG and amorphous bioactive glass (ABG) were immersed in three different types of protein solutions containing 10% fetal bovine serum (FBS) in tissue culture medium, bovine serum albumin (BSA), and fibronectin (FN) for 4 hours at 37° C. Changes in conformation and adsorption were analyzed using Fourier transform infrared spectroscopy (FTIR) and the grazing angle accessory.

The primary focus of conformation relied on the expression of the Amide I and Amide II bands. Cell culture experiments and image analysis were used to establish a relation between the conformation of the proteins on each type of BG with the success of cell attachment and growth. FTIR data suggested that BG crystallization contributed to significant changes in the conformation of all proteins adsorbed onto the surface of BG. Moreover, the expression of particular functional groups appeared to be dependent upon the type of protein used and the surface chemistry of the BG. While the Amide II functional group dominated the surface of ABG and CBG with adsorbed FBS and CBG with BSA, the Amide I band was predominant in ABG and CBG samples with FN and ABG with BSA.

In conjunction with the changes in protein conformation, we observed significant enhancement in cell spreading on protein-coated amorphous BG surfaces. Furthermore, BG containing adsorbed FN displayed the most significant increase in cell growth. Thus, the adsorption of FN onto BG appears to provide a much more successful interface for cell attachment to the biomaterial than BSA or FBS. As a result, greater cell spreading will occur, which will promote tissue integration with the material. It was also shown that protein conformation plays a more crucial role in cell attachment than the quantity of protein on the surface of the material. By using total protein analysis, the results indicated that BSA adsorbs more readily to ABG than FN. Thus, a greater quantity of protein does not necessarily mean an increase in cell attachment. The results of this study clearly show the effect of material structure and protein adsorption on the success of cell attachment.

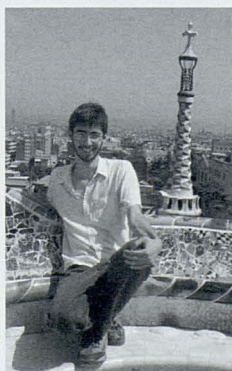
### CATEGORY 7: Social Sciences

#### 1st Place

**NAME: Andrew Bozio**

**TITLE: Europe and Its Union: The Meaning and Extent of a Continent**

In the latter half of the twentieth century, Europe forged a new identity from the ruins of two world wars. The result of this metamorphosis is the contemporary institution of the European Union (EU), which this paper analyzes to discuss the changing meanings of modern Europe. Looking at post-war years, as well as development during the Cold War, this paper charts a line of continuity in the formation



of the EU that is used to suggest its purpose in the coming decades. Finally, the paper attempts to qualify this thesis by commenting on the difficulties of using the EU as a synonym for contemporary Europe.

#### 2nd Place

**NAME: Amanda Gatewood**

**TITLE: Bratz: How Did They Kick Barbie to the Curb While Wearing Such High Heels?**



In this paper, I examine the emergence and domination of a new toy product, the Bratz doll, and discuss the possible cultural undercurrents to which the doll's immense popularity appeals. The Bratz's emergence into the marketplace resulted in a seven quarter slide in Barbie sales, the previous and perennial leader in girls' toys. I discuss the implications that Barbie's and the Bratz's images and cultural connotations have for young girls' psyches as they navigate cultural messages about friendship, womanhood, consumerism, racial, and ethnic identity.

Much of the paper is dedicated to examining the reality of womanhood displayed by these dolls. Do the Bratz dolls, in their inhuman facial and body proportions and race-less appearances, appeal to girls more than the standard Barbie? Is the popularity of the Bratz dolls retaliation against the hegemonic beauty standards of Barbie? Is one of the dolls more sexualized than the other and, if so, which one? How does this reflect the image of girls in our culture, and how do girls interpret this image? Does the early "adultification" of girls result from such an image? What are the class considerations inherent in the marketing and sales of urban-chic Bratz dolls to girls whose families can pay the extremely high prices for the dolls?

Additionally, I analyze the self-proclaimed marketing strategies of Mattel and MGA for their respective dolls to balance cultural perceptions of the doll with attempted projections of a product. What does our culture say about the importance of image within children's play, and how does girls' play reflect or reject these cultural preferences?